

PROCEEDINGS OF THE
ROYAL ENTOMOLOGICAL SOCIETY
OF LONDON

SERIES C. JOURNAL OF MEETINGS

VOLUME 6.

No. 9, 1941.

GENERAL MEETING

3RD DECEMBER, 1941, at 3.0 p.m.

AGENDA

1. Confirmation of the Proceedings of the General Meeting held on 5th November.
2. Recommendations of candidates for Fellowship.
3. Announcement of election of new Fellows.
4. The following additions have been made to the Library since the meeting on 5th November, 1941.

Presented.

Claassen, P. W. : A Catalogue of the Plecoptera of the World. [*Mem. Cornell Agric. Exp. Sta.* 232, 1940.]

Beirne, B. P. : A list of the Microlepidoptera of Ireland. [*Proc. R. Irish Acad.* 47 (B) : 53-147, 1941.] [The author.]

In addition, reprints have been presented by the U.S. Department of Agriculture, the Imperial Institute of Entomology, Dr. Julian Huxley, F.R.S., the U.S. National Museum, the American Entomological Society, Mr. P. G. Shute, and Mr. N. C. E. Miller.

5. Admission of Fellows.
6. Nominations for Officers and Council for 1942.
7. Communications.

1. Dr. K. G. Blair (President).

Strepsiptera parasitic on a grasshopper from New Britain.

2. Mr. H. Willoughby Ellis, M.I.E.E.

John Sang's original paintings of Coleoptera.

3. Mr. E. B. Ford, M.A.

The chemistry of red pigments in the genus *Delias* Hübner (Lepidoptera) with reference to their bearing on classification.

I have so far found five chemically distinct types of red pigment in the Lepidoptera, and two of them occur in the genus *Delias* (PIERIDAE). These are both uric acid compounds, giving a positive murexide reaction. They can be distinguished by their behaviour with strong mineral acids (*e.g.* HCl). These convert one of them to a bright yellow colour (reconvertible by ammonia), but not the other. Only the latter type is found in the *pasithoë* Group: in all other Groups the pigment converted to yellow by acids is present. Thus the pigments are not distributed at random in respect of the present classification. The chemistry of the red pigments in *Delias* therefore supports the classification of the genus on grounds wholly distinct from those upon which it has been devised.

4. Communications and exhibits the titles of which have been received since the circulation of these agenda.

Fellows are particularly requested to bring suitable exhibits to the General Meeting even though it may not be possible to announce their intention to do so before the meeting.

Tea will be served in the Library after the meeting.

PROCEEDINGS OF THE GENERAL MEETING HELD ON 5TH NOVEMBER, 1941.

Dr. K. G. BLAIR, President, in the Chair.

Present, 28 Fellows.

The minutes of the meeting held on 1st October were confirmed and signed by the President.

The Secretary read the name of the following new candidate for election :
J. E. H. Roberts.

Thanks were voted to donors of gifts to the Library since the last meeting.

Mr. R. A. Crowson signed the Obligation Book and was admitted a Fellow.

The Secretary read for the first time the following names of Officers and Council nominated for the ensuing year :—

President : Professor P. A. Buxton, M.A.

Treasurer : A. Welti.

Secretary : N. D. Riley, F.Z.S.

Other Members of Council :

R. B. Benson, M.A.

K. G. Blair, D.Sc.

Professor H. G. Champion, C.I.E., M.A.

A. S. Corbet, D.Sc., Ph.D., F.I.C.

E. B. Ford, M.A., B.Sc.

G. Fox-Wilson, N.D.H.

A. G. Gabriel.

C. T. Gimingham, O.B.E., F.I.C.

C. Potter, B.Sc., Ph.D.

G. Salt, Ph.D., D.Sc.

John Smart, B.Sc., Ph.D.

W. H. T. Tams.

W. H. Thorpe, M.A., Sc.D.

C. B. Williams, M.A., Sc.D.

Alternative nominations, supported by four properly qualified Fellows, must reach the Secretary before the meeting to be held on 3rd December, 1941.

The following papers were read in title :—

“Studies in the migration of Lepidoptera.” By C. B. Williams, G. F. Cockbill, A. Downes, and Miss Gibbs.

“A key to the genera of larvae of CARABIDAE.” By F. Van Emden.

Communications were made by Dr. O. W. Richards, Dr. F. I. Van Emden, and Mr. Francis J. Griffin, abstracts of which appeared on page 18.

N. D. RILEY, *Hon. Secretary*.

NOTICES

ADMISSION OF FELLOWS

Any Fellow who has not been formally admitted to the Society under Chapter XIV, Section 4 of the Bye-Laws and attending the meeting on 3rd December, 1941, is requested to inform the Registrar before 2.45 p.m. on that date.

THE GENERIC NAMES OF BRITISH INSECTS, prepared by the Committee on Generic Nomenclature of the Royal Entomological Society of London, with the assistance of the Department of Entomology of the British Museum (Natural History):

- | | | |
|---------|---------------------------------------------------------------------------------------------------|----------------|
| Part 1. | Recommendations relating to the publication of the committee's reports | price 6d. |
| Part 2. | The generic names of the British Rhopalocera with a check list of the species | price 3s. 6d. |
| Part 3. | The generic names of the British Odonata with a check list of the species | price 3s. 6d. |
| Part 4. | The generic names of the British Neuroptera, with a check list of the British species | price 3s. 6d. |
| Part 5. | The generic names of the British Hymenoptera Aculeata, with a check list of the British species | price 15s. 0d. |
| Part 6. | The generic names of the British CARABIDAE, with a check list of the British species | price 10s. 0d. |
| Part 7. | The generic names of the British Hydradephaga, with a check list of the British species | price 5s. 0d. |

STYLOPS, a Journal of Taxonomic Entomology.

1932-1935. Vols. 1-4 (all issued). Price £1 16s. 0d. each; to Fellows, £1 7s. 0d.

ABSTRACT OF PROCEEDINGS OF THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON. 1935. Nos. 1-6 (all issued). 3s. 0d.

HÜBNER: A BIBLIOGRAPHICAL AND SYSTEMATIC ACCOUNT OF THE ENTOMOLOGICAL WORKS OF JACOB HÜBNER AND THE SUPPLEMENTS THERETO. In 2 vols. By Francis Hemming.

Price Vol. 1. 605 pp. £1 15s. 0d.
 ,, Vol. 2. 275 pp. 15s. 0d.

The next Meeting (Annual Meeting) will be held on 21st January, 1942.

Published by THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON and sold at its Rooms, 41, Queen's Gate, S.W.7, price 6d.

PROCEEDINGS OF THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON

SERIES C. JOURNAL OF MEETINGS

VOLUME 6.

No. 9.

Report of the Council, 1941.

In spite of the war the Society has completed its 108th year with no greater anxieties than were encountered in 1940. Apart from the destruction of one book, Schmiedeknecht's *Hymenoptera Mitteleuropas*, whilst on loan to a Fellow, enemy activity has caused no more serious damage to date than the breakage of a few panes of glass when a heavy bomb fell within a hundred yards of the Society's premises on the night of 10th May. Much greater trouble was caused by a very serious storm on 12th July, which flooded the basement and did some damage to the Meeting Room, especially the benches, since made good.

Continuing the precautionary measures started in 1940, the dispersal of the Library (except for works constantly in use, easily replaced or of no great value) was completed early in 1941, and it is of interest to put on record that the dispersed books are now distributed in the following localities where they are being cared for by the Fellows and others indicated in the list: Stroud (Mr. Bainbrigge Fletcher); Leckford, Hants (Miss E. F. Chawner); Wisley, Surrey (Mr. G. Fox-Wilson); Bangor (University College of North Wales); Beaumaris, Anglesey (Dr. I. Thomas); Henley (Dr. H. Scott, British Museum (Natural History)); Hereford (Dr. J. Smart, British Museum (Natural History)); Bridgwater, Somerset (Mr. J. Cowley); Ambleside (Mr. W. E. China, British Museum (Natural History)); Slough (Prof. J. W. Munro, Imperial College of Science); Trefriw, North Wales (Mr. J. Balfour-Browne); Oxford (Professor G. C. Champion); Newport, Salop (Harper Adams Agricultural College); Kings Langley, Herts (Dr. J. MacLeod); Grange-over-Sands (Mr. A. E. Wright); Bath (Mr. Hugh Main); St. Albans (Mr. F. J. Reed); East Malling, Kent (Dr. A. M. Massee); Loughborough (Mr. A. Roebuck); Camborne, Cornwall (Mr. F. A. Turk); National Library of Wales, Aberystwyth (Dr. Llewellyn Davies).

It is a pleasure to the Council to record the debt owed and to express its sincere thanks to all those responsible for this great assistance rendered to the Society, a debt which is increased by the willing co-operation which has been so evident in making volumes available for loan by post, thus enabling the Society to maintain fully this branch of its services to its Fellows and to Entomology in general.

In accordance with the provisions of the Act relating to War Damage to Property, an insurance has been effected on the Society's house, and in addition insurance has been effected with the Board of Trade against war risk to the Library. Since the latter policy is a first-risk policy, cover has been obtained sufficient to replace any single part of the Library which at a given time is in

one place to a value of £2000. The Society's furniture, office equipment, and stock of publications have been insured against war risk for £4000, and the portraits and objects of a museum nature for £100.

As a result of a revaluation the fire insurance on the panelling and ceiling in the meeting room, the benches and chairs and the President's rostrum and chair have been increased to £5237.

Attendance at General Meetings has continued to be affected by the absence of many Fellows now serving with the Forces, and by the removal of others to a distance. The difficulties of travelling and lighting were partly overcome by holding the meetings of the Society at 3 o'clock in the afternoon instead of in the evening, and at the nine meetings held the average attendance was 29 Fellows and Visitors which, in view of all the circumstances, may be considered satisfactory.

With the adaptation to war conditions which has been evident during the year the Council felt that its emergency policy of permitting the several committees to conduct affairs by post should cease and meetings should be resumed. This return to normal practice has worked well and much detailed work has been carried out by the Finance Committee under the Chairmanship of Mr. A. Welti, the Publication Committee under the Chairmanship of Dr. O. W. Richards, and the Library Committee under the Chairmanship of Professor P. A. Buxton. The thanks of the Council are due to those Fellows who have served on these Committees.

As already mentioned, the Library has continued to render full services to Fellows during the year. Accessions have been few, except from within the British Empire and from the United States of America, and as a result more attention has been paid to the arrears of binding, but much still remains to be done in this direction. The number of Fellows who have borrowed books during the year was 348 (365), and the number of books borrowed 676 (881). (The numbers in brackets in this and the following paragraphs indicate the corresponding figures for the previous year.) In addition 12 (63) books were lent to the National Central Library. With the removal of many Libraries from London, readers are faced with an increased difficulty in obtaining books they need and it is therefore a great pleasure to be able to record that much assistance has been received from the libraries of other scientific organisations. It is hoped that the Society's desire to give reciprocal help will become widely known during the present emergency.

The standard of the Society's publications during the year has been well maintained. No appreciable falling off in the numbers of papers submitted for the consideration of the Publication Committee can as yet be detected.

Volume 91 of the *Transactions* was published in 1941 in 13 parts. Of the 13 papers, 4 deal with Hymenoptera, 3 with Lepidoptera, and 1 each with Coleoptera, Odonata, Orthoptera, Plecoptera, Thysanoptera and General Entomology. The volume consists of 717 pages and is illustrated by 19 coloured plates, of which Dr. L. G. Higgins presented one-half of the 16 illustrating his paper, and the late Miss Janet Riddell presented the 3 illustrating her paper.

The *Proceedings* were continued in 3 series, as follows:—

Series A. General Entomology. Volume 16, consists of 126 pages, containing 18 papers.

Series B. Taxonomic Entomology. Volume 10, consists of 255 pages, containing 37 papers.

Series C. Journal of Meetings. A part of *Series C* was distributed to each Fellow in advance of meetings, and a complete copy of the volume will be sent with the last part.

No part of the *Generic Names of British Insects* was published during the year, but several papers are in preparation, and it is hoped to publish them during 1942.

During the year the death of 1 Honorary Fellow, H. Rebel, and 15 (14) Fellows has been reported : C. Bartlett, H. F. D. Bartlett, Mrs. M. D. Brindley, C. Turner Clark, W. M. Crawford, H. Eltringham, W. H. B. Fletcher, H. O. Holford, J. H. Keys, C. G. Lamb, J. Levick, A. Moore, Miss J. Riddell, W. G. Whittingham, and D. S. Wilkinson.

The following 10 (8) have resigned : M. D. Austin, R. Cottam, C. Harukawa, J. Henderson, C. M. Inglis, F. Laing, T. A. Lofthouse, Mrs. E. M. Potter, B. Stewart, and J. B. G. Tulloch.

During the year 17 (21) Fellows have been elected, of whom 16 have fulfilled their obligations and 2 (1) have taken advantage of the scheme for entrants under 25 years of age.

At 31st December last the Society consisted of 11 Honorary Fellows, 6 Special Life Fellows and 670 Ordinary Fellows, a total of 687 (682).

It is with regret that the Council have received the resignation of Brigadier W. H. Evans from the Honorary Treasurership of the Society and they are glad to welcome Mr. A. Welti as his successor.

Many Fellows will also regret the loss of Sergeant Webb, our porter and housekeeper since 1922, who resigned on 11th July. His place has been well filled by Sergeant Campbell, who took up his duties on 25th August.

Treasurer's Report.

Brigadier Evans said :—

I have prepared the accounts for 1941 in an entirely new form. I found it very difficult to understand the system of accounts which was introduced twelve years ago, nor could I find any Fellow who could understand them. Our accounts are prepared by a firm of Chartered Accountants and the system they employ is essential for a Company, whose primary object is to ascertain and apportion the profits of the year's operation : and a Company finds it essential to employ a trained accountant. We are not a Company, nor have we a trained accountant : nevertheless, it is essential for the Treasurer to understand the accounts for which he is responsible and a Fellow has a right to have the accounts presented to him in a form he can readily understand.

I devoted a great deal of my time to considering the best form of accounts for the Society, and from long experience finally decided that it was necessary for us to revert to the system employed by the Society during the first hundred years of its existence and which is the system understood by everyone : that is, we start the year with a cash balance, record what we receive and spend during the year and count up what we have left at the end of the year, recording what we owe and are owed and leaving it at that. Where accounts, as in our case, are kept for separate funds, a double entry is needed, but this presents no difficulty, nor does the preparation of a balance sheet. This is the system known as "Receipts and Payments." The Company system deals with "Income and Expenditure," excluding the carry-over from the preceding year

and including the carry-over to the following year at an anticipated figure : this elaboration of the accounts entails complications, which require expert handling and for our purpose is unnecessary. The accounts which I present to you consist of a Financial Statement or balance sheet, the cash account and the details of the expenditure in the General Account. My proposals have been accepted by the Finance Committee, with the proviso that for the sake of continuity the auditors' accounts based on the Company System should be published as an annexure.

Certain principles and changes in procedure have been introduced, which, though they may render the accounts for 1941 somewhat complicated, will result in avoiding complications in the future. These are :—

(1) The anchoring of the accounts to the actual cash balances in the bank, etc. In 1941 this has entailed the inclusion of a number of transactions embodied in the 1940 accounts, but not entered in the bank pass book until 1941. The net effect is the inflation of the opening credit balance by £608 and of the receipts and payments to the same extent. There is, of course, no financial effect and such an occurrence should not be repeated.

(2) The earmarking of capital assets instead of cash for expenditure at some future date on objects approved by the Council. These objects are Special Publications, Arrears of Binding and Periodical Repairs to Premises. This principle had already been adopted in the case of Special Publications. Its adoption in the other two cases has no financial effect, but it has the important result of releasing cash for general expenditure.

(3) The transfer at the end of the year to the General Account of all the balances in the Fund Accounts (other than the Suspense Account), followed by the transfer back to any fund of an amount sufficient to meet the net carry-over. This year the only fund with a carry-over is the Publications Fund. There is, however, a proviso made by the Finance Committee, that at the time of framing the budget for the following year any unexpended amount for the purchase of books should be added to the Library grant. The effect of this proposal is to simplify budgeting, in that, having provided for the carry-over, attention need be devoted only to the programme for the current year.

(4) The establishment of a Publications Fund for dealing with all publications and of a Suspense Account for recording transactions relating to other than the current year. It has also been decided that for the future the Endowment Fund should be abolished : the capital assets held therein will be called the "Capital Reserve" and the interest therefrom credited to the General Fund. The interest from the Trust Funds will continue to be credited to the fund accounts concerned.

(5) The exclusion from the accounts of routine debts and dues of a minor nature. The inclusion of such items needlessly complicates the accounts and any small difference is amply covered by our unvalued assets, such as stock of publications.

(6) The transfer from the Library to the Publications Fund of the cost at Fellows' rates of the publications sent in exchange so as to afford an indication of the increase in the value of the Library.

When I consulted our most successful ex-Treasurer, Mr. Sheldon, regarding my proposals, he replied that the form in which the accounts were presented was quite immaterial, as no Fellow ever looked at them. But I think the average Fellow does like to know whether the Society is going uphill or downhill. This question can readily be answered by looking at the "Financial

Statement.” The answer this year is that we have gone downhill to the extent of £519 10s. 1d., which is the difference between our assets at the beginning and end of 1941. The Capital Account has actually appreciated to the extent of £200, made up of £100 as the final amount of the bequest made by the late Mr. W. S. Gilles, and £100 bequeathed to us by the late Miss M. E. Fountaine. The Cash Account, taken together with the Debts and Dues, consequently indicates a decline of £719 10s. 1d. and it devolves upon me to explain how this has occurred.

A portion of the excess was due to unforeseen expenditure as follows in connection with the General Fund :—

(1) War Insurance £142. Of this £27 8s. was for compulsory insurance on our premises for cover up to 31st August, 1941, and a similar premium has to be paid annually for four more years : no announcement has yet been made regarding cover for subsequent periods. The remainder is voluntary and provides for cover on our property up to 30th September, 1942, but a further £69 has to be paid in 1942.

(2) Minor items of £117, comprising a gratuity of £50 to the retiring caretaker, £11 for the uniform for the new caretaker, £27 war bonus to the Clerical Assistant, and £29 on special repairs to furniture and fittings.

The greater part of the excess occurred in connection with the publications programme for 1941. It will be realised that under present conditions the estimating of costs of the production of plates and of printing is no easy matter. The Publications Committee were permitted to embark on a programme estimated to cost £1920, on the assumption that the following funds would be available :—

From sales of the 1941 issue	£1000
From donations, whereof £50 was generously granted by the Royal Society and £200 presented by Dr. Higgins towards the cost of his paper	300
Excess of £200 on Dr. Higgins paper authorised by Council and found from the carry-over from the preceding year	200
To be found by the Society	400
Total	<u>£1900</u>

It will be seen from the accounts that the programme has worked out as follows :—

Cost of publications paid in 1941	£926
To be paid in 1942	1306
Total	<u>£2232</u>

While the receipts from sales amount to £503 in 1941 and £528 is expected in 1942, yielding £31 more than expected. Consequently the excess amounts to about £300, of which £200 was due to an advance in the cost of printing and £100 to some of the papers costing more than was anticipated.

The remainder of the excess is due to the reduction of the balances on the Library and Repairs to Premises Funds. No grant had been made for these purposes, so that as much money as possible should be allocated to publications. Later in the year, as I have already remarked, it was decided to make good their balances in the Capital Reserve, thereby setting free cash to meet current expenditure. Had this not been done and had the bills for the publications

been sent in before the end of the year, it might have been necessary to sell securities.

Against the expenditure in excess of our income may be set forth the maintenance of the publications at the same high standard that has obtained during the last few years, and since the Society could well afford to do this, I do not think any apology is needed.

I do not think I need offer any further explanation regarding the accounts, which I have tried to make as clear as possible. Should any Fellow consider that the form I have introduced is to be preferred to the previous form, or vice versa, I am sure that my successor would be glad to be informed.

THE ROYAL ENTOMOLOGICAL SOCIETY OF LONDON.

STATEMENT OF INCOME AND EXPENDITURE for the Year ended 31st December, 1941.

(Presented at the Annual Meeting, 21st January, 1942.)

GENERAL FUND.

INCOME.				EXPENDITURE.			
1940.	£	£	s. d.	1940.	£	£	s. d.

STATEMENT OF INCOME AND EXPENDITURE for the Year ended 31st December, 1941.

LIBRARY FUND.		EXPENDITURE.	
1940. £	1940. £	£	s. d.
INCOME.			
44	To interest on investment—Hamilton Druce Bequest Fund	31	33 8 3
250	transfer from General Fund ...	136	108 6 6
294	transfer from Publications Fund ...	167	141 14 9
	excess of expenditure over income carried to Balance Sheet ...		254 0 0
		127	—
		<u>£294</u>	<u>£395 14 9</u>

REPAIRS TO PREMISES FUND.

REPAIRS TO PREMISES FUND.		EXPENDITURE.	
1940. £	1940. £	£	s. d.
INCOME.			
80	To transfer from General Fund	27	55 9 2
	excess of expenditure over income carried to Balance Sheet ...	53	—
		<u>£80</u>	<u>£55 9 2</u>

PUBLICATIONS FUND.

PUBLICATIONS FUND.		EXPENDITURE.	
1940. £	1940. £	£	s. d.
INCOME.			
	To sales ...		2,229 13 9
	donations towards publications ...		254 0 0
	transfer from Library Fund ...		—
	Value of exchanges ...		—
	transfer from General Fund ...		—
		<u>£2,483 13 9</u>	<u>£2,483 13 9</u>

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LIBRARY FUND.

LIABILITIES.		£	s.	d.	£	s.	d.
To Trust Fund.	Hamilton Druce Bequest—	1,000	0	0
	as at 31st December, 1940	...	...	...	12	0	0
	creditors	...	...	...
	“ excess of assets over liabilities—	...	...	...
	as at 31st December, 1940	...	...	...
	add transfer from Capital Reserve Fund	...	...	...	170	7	10
		...	...	...	200	0	0
	less excess of expenditure over income for year	...	...	...	370	7	10
		...	...	...	97	18	3
		...	...	...	272	9	7
	less transfer to General Fund of surplus cash balance	...	...	...	72	9	7
		...	...	...	200	0	0
		...	...	...	£1,212	0	0
		...	...	...	£1,212	0	0

REPAIRS TO PREMISES FUND.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
To creditors	...	...	...	By £350 3% National Defence Bonds at cost	...	...	...
" excess of assets over liabilities—	...	...	...	(market value at date £352 12s. 6d.)	...	...	...
as at 31st December, 1940	...	...	...	" cash at bank	...	...	...
add transfer from Capital Reserve Fund	...	...	...		...	...	...
	321	4	0		...	...	...
	350	0	0		...	...	...
	<hr/>			
	671	4	0				
less excess of expenditure over income for							
year	25	9	2				
transfer to General Fund of surplus	295	14	10				
cash balance	...	...	...	
	321	4	0				
	<hr/>						
					350	0	0
					<hr/>		
					£350	16	7
					<hr/>		

PUBLICATIONS FUND.

LIABILITIES.				ASSETS.			
To Trust Fund. Westwood Bequest—	£	s.	d.	By Trust Fund Investment—	£	s.	d.
as at 31st December, 1940	...	...	...	£239 12s. 4d. Birmingham Corporation 3% Stock 1947,	250	0	0
" interest on investment received	...	...	...	at cost	...	...	...
" creditors—	...	...	...	(market value at date £218 0s. 7d.)	...	...	...
publications	1,306	5	0	" £600 3% National Defence Bonds at cost	600	0	0
donation to publications received in advance	100	0	0	(Market value at date £604 10s. 0d.)	...	...	...
Excess of assets over liabilities—	...	...	1,406 5 0	" sundry debtors	528	7	7
transfer from Special Publications Fund—balance at	662	6	9	" cash at bank—	...	...	...
31st December, 1940	...	...	...	Post Office Savings Bank	505	6	10
(Not available for ordinary publications)	18	0	0	current account	379	14	3
add interest on investment	...	...	...		885	1	1
transfer to General Fund of surplus cash balance	680	6	9				
	80	6	9				
	600	0	0				
			<u>£2,263 8 8</u>				<u>£2,263 8 8</u>

CAPITAL RESERVE FUND (FORMERLY ENDOWMENT FUND).

LIABILITIES.

	£	s.	d.	£	s.	d.
To excess of assets over liabilities— as at 31st December, 1940	6,246	11	8			
add admission fees	34	13	0			
interest on investments (gross)	205	12	10			
Balance of bequest by the late W. S. Gillies, Esq.	101	11	4			
Bequest by the late Miss M. E. Fountaine	100	4	1			
	6,688	12	11			
less transfer to General Account for 34 Fellows who compounded their subscriptions	71	8	0			
transfer to Library Fund	200	0	0			
transfer to Repairs to Premises Fund	350	0	0			
transfer to General Fund of cash balance	158	17	8			
	780	5	8			
	£5,908	7	3			

(Signed) W. H. EVANS, *Treasurer*.

We have audited the above Balance Sheets and Accounts with the Books and Vouchers of the Society and certify them to be correct. The Solicitors have certified to us that they hold the Deeds of 41 Queen's Gate for safe custody on behalf of the Society, and we have verified the Investments and Bank Balances.

224, *Regent Street*,
London, W. 1.
15th *January*, 1942.

(market value at date £6,223 14s. 7d.)

ASSETS.

	£	s.	d.	£	s.	d.
By freehold premises 41 Queen's Gate (cost including alterations £13,417 3s. 4d.)	...	...	...	...	...	...
" investment at value 6th March, 1934—	...	...	...	...	...	...
£532 3s. 5d. 4% Consols	...	...	...	591	7	6
" investments at cost—	...	...	...	...	...	...
£1,094 10s. 0d. 3% Conversion Loan	...	...	...	1,152	2	3
£1,079 5s. 5d. 3% Funding Stock, 1959-69	...	...	...	1,001	2	6
£1,170 0s. 0d. 3% Redemption Stock, 1986-96	...	...	...	1,000	9	0
£593 17s. 10d. Mersey Docks and Harbour Board 3½% Debenture Stock, 1970-80	...	...	...	498	8	6
£50 3% National Defence Bonds	...	...	...	50	0	0
£600 3½% War Stock	...	...	...	609	2	0
£1,000 3% War Stock	...	...	...	1,005	15	6
	...	...	...	5,908	7	3
	£5,908	7	3			

(Signed) W. B. KEEN & Co., *Chartered Accountants*.

COMMITTEE FOR THE PROTECTION OF BRITISH INSECTS.

RECEIPTS AND PAYMENTS ACCOUNT for the Year ended 31st December, 1941.

RECEIPTS.

	£	s.	d.
To balance 1st January, 1941	13	8	4
" donations	19	1	0
	£32	9	4

(Signed) W. H. EVANS, *Treasurer*.

We have audited the above Account of Receipts and Payments and certify it to be correct.

224, *Regent Street*,
London, W. 1.
15th *January*, 1942.

PAYMENTS.

	£	s.	d.
By expenditure on preservation of <i>M. arion</i> and <i>L. dispar</i>	...	...	...
" balance 31st December, 1941	...	...	...
	£32	9	4

(Signed) W. B. KEEN & Co., *Chartered Accountants*.

FINANCIAL

1st Jan. 1940. £		LIABILITIES.										Details. £ s. d.			Total. £ s. d.		
BALANCES ON 1ST JANUARY, 1941.																	
1. CAPITAL ACCOUNT.																	
6,250		(a) Property :—premises 41 Queen's Gate : at cost										6,250			0 0		
1,250		(b) Trust Funds : at cost—															
		(1) Westwood Bequest. Dividend to be applied to cost of illustrations										250			0 0		
		(2) Hamilton Druce Bequest. Dividend to be applied to cost of books										1,000			0 0		
															1,250 0 0		
(c) Investments : at cost. Dividends credited to the Endowment Fund—																	
600		(1) Reserved for Special Publications										600			0 0		
4,643		(2) Unreserved										6,258			7 3		
															6,858 7 3		
£12,743		Total Capital Account													£14,358 7 3		
431 2. CASH ACCOUNT.																	
		(a) Post Office Savings Bank										782			4 7		
		(b) Bank										220			19 9		
		(c) Petty cash										11			0 7		
															1,014 4 11		
£13,174		Total Assets													£15,372 12 2		
3. DEBTS AND DUES.																	
(a) Debts—																	
110 {		(1) Publications cost										183			0 0		
18 {		(2) Routine items : being discontinued										82			2 3		
		(3) Credit Balance of Suspense Account										669			12 1		
£129		Total Debts										£934			14 4		
(b) Dues—																	
		(1) Arrears 1940 : Subscriptions										50			0 0		
		(2) Admission Fees										17			17 0		
		(3) Publications Sales										373			3 10		
		(4) Publications Donations										17			9 4		
		(5) Refund of income tax										14			1 3		
		(6) Routine items : being discontinued										143			10 8		
£355		Total Dues										£616			2 1		
+226		Deduct : Excess of Debts over Dues													318 12 3		
£13,400		NET ASSETS ON 1ST JANUARY, 1941													£15,053 19 11		

ADDITIONS TO ASSETS IN 1941.

1,615		1. CAPITAL ACCOUNT.					
(3) 52		Investments at cost (unreserved)—					
		(i) Remainder of Bequest by the late W. S. Gilles, Esq.					
		(ii) Bequest by the late Miss M. E. Fountaine					
		Total Additions to Assets					
£15,067		TOTAL					

(Signed) W. H. EVANS, *Treasurer*.

We have examined the above Financial Statement and accompanying Cash Account of the Honorary

224, *Regent Street,*
London, W. 1.

15th January, 1942.

STATEMENT FOR 1941.

ASSETS.

31st Dec. 1940. £							Details. £ s. d.	Total. £ s. d.
BALANCES ON 31ST DECEMBER, 1941.								
	1. CAPITAL ACCOUNT (excludes library, furniture and additions to property).							
6,250	(a) Property. No change							6,250 0 0
1,250	(b) Trust Funds. No change. Dividends credited to Funds concerned							1,250 0 0
	(c) Investments: at cost. Dividends credited to the Endowment Fund—							
	(1) Reserved for Periodical Repairs					350 0 0		
600	(2) Reserved for Special Publications					600 0 0		
	(3) Reserved for Library					200 0 0		
6,258	(4) Unreserved					5,908 7 3		
							7,058 7 3	
£14,358	Total Capital Account							£14,558 7 3
416	2. CASH ACCOUNT.							
	(a) Post Office Savings Bank					505 6 10		
	(b) Bank					271 5 8		
	(c) Petty Cash					25 3 6		
							801 16 0	
£14,774	Total Assets							£15,360 3 8
	3. DEBTS AND DUES (excludes routine items, all of a minor nature).							
	(a) Debts—							
183	(1) Publications cost					1,306 5 0		
82	(2) Routine items: discontinued					—		
72	(3) Credit Balance of Suspense Account					133 11 0		
£337	Total Debts					£1,439 16 0		
	(b) Dues—							
50	(1) Arrears 1941: Subscriptions					76 6 0		
18	(2) „ „ Admission Fees					9 9 0		
373	(3) „ „ Publications Sales					528 7 7		
17	(4) „ „ Publications Donations					—		
14	(5) „ „ Refund of income tax					—		
142	(6) Routine items: discontinued					—		
£615	Total Dues					£614 2 7		
+£278	Deduct: Excess of Debts over Dues						825 13 5	
£15,052	NET ASSETS ON 31ST DECEMBER, 1941							£14,534 9 10

REDUCTIONS IN ASSETS IN 1941.

	2. CASH ACCOUNT (see annexure for details).							
	Payments during 1941					£3,737 8 3		
15	Less Receipts during 1941					3,524 19 4		
							212 8 11	
On other side.	3. DEBTS AND DUES.							
	Excess of Debts over Dues on 31st December					825 13 5		
	Less Excess of Debts over Dues on 1st January					318 12 3		
							507 1 2	
	Total Reduction in Assets						£719 10 1	
£15,067	TOTAL							£15,253 19 11

Treasurer and have reconciled them with the Accounts certified by us.

(Signed) W. B. KEEN & Co., Chartered Accountants.

CASH ACCOUNT

RECEIPTS.

RECEIPTS.										Gross, including Transfers.		Direct.			
1940.										£	s.	d.	£	s.	d.
£	BALANCE ON 1ST JANUARY, 1941.														
44	Library Fund ...	...	...	...	...	...	...	...	...	170	7	10			
117	Publications Fund ...	...	...	...	...	...	...	...	...	62	6	9			
268	Repairs Fund ...	...	...	...	...	...	...	...	...	321	4	0			
45	Suspense Account ...	...	...	...	...	...	...	...	...	669	12	1			
+ 474	Total Credit	...	...	...	...	...	...	...	...	£1,223	10	8			
— 43	General Account	...	...	...	...	...	...	...	...	197	10	2			
	Endowment Fund	...	...	...	...	...	...	...	...	11	15	7			
— 43	Total Debit	...	...	...	...	...	...	...	...	£209	5	9			
— 431	Total Net Credit Balance	...	...	...	...	...	...	...	...	£1,014	4	11	£1,014	4	11

RECEIPTS DURING 1941.

GENERAL ACCOUNT.									
1,156	(a)	Subscriptions for 1941 ...	...	...	...	...	...	1,102 5 10	
38	(b)	Arrears ...	...	...	...	...	...	72 3 0	
250	(c)	Rent from Tenant ...	...	...	...	...	...	250 0 0	
262	(d)	Contribution to House Expenses ...	...	...	...	...	...	246 13 8	
22	(e)	Interest P.O. Savings Bank and Miscellaneous ...	...	...	...	...	...	24 0 11	
270	(f)	Transfers from other Heads R, E and S ...	...	...	...	...	...	564 13 4	1,695 3 5
£2,004		Total G ...	...	...	...	...	...	£2,259 16 9	
LIBRARY FUND.									
44	(a)	Dividend Hamilton Druce Bequest ...	...	...	...	...	...	43 16 6	43 16 6
250	(b)	Transfers from G ...	...	...	...	...	...	170 2 7	
£294		Total L ...	...	...	...	...	...	£213 19 1	
PUBLICATIONS FUND.									
1,044	(a)	Sales of 1941 issue ...	...	...	...	...	...	499 10 2	
158	(b)	Arrears ...	...	...	...	...	...	360 18 3	
23	(c)	Dividend from Westwood Bequest ...	...	...	...	...	...	7 3 8	
22	(d)	Donations for 1941 issue ...	...	...	...	...	...	250 0 0	
	(e)	Arrears ...	...	...	...	...	...	17 9 4	
399	(f)	Transfers from G, L and S ...	...	...	...	...	...	689 1 5	1,135 1 5
£1,646		Total P ...	...	...	...	...	...	£1,824 2 10	
REPAIRS TO PREMISES FUND.									
80	(a)	Transfers from G ...	...	...	...	...	...	—	—
£80		Total R ...	...	...	...	...	...	—
ENDOWMENT FUND.									
52	(a)	Admission Fees for 1941 ...	...	...	...	...	...	38 14 0	
8	(b)	Arrears ...	...	...	...	...	...	12 12 0	
1,600	(c)	Bequest: by the late W. S. Gilles, Esq. ...	...	...	...	...	...	101 11 4	
	(d)	Miss M. E. Fountaine ...	...	...	...	...	...	100 4 1	
175	(e)	Dividends for 1941 ...	...	...	...	...	...	223 12 10	
	(f)	Arrears ...	...	...	...	...	...	14 1 3	
	(g)	Sale of investments ...	...	...	...	...	...	—
£1,835		Total E ...	...	...	...	...	...	£490 15 6	490 15 6
SUSPENSE ACCOUNT.									
22	(a)	Subscriptions for 1942 ...	...	...	...	...	...	29 16 0	
50	(b)	Donations for 1942 ...	...	...	...	...	...	100 0 0	
	(c)	Miscellaneous ...	...	...	...	...	...	1 13 0	
	(d)	Clearance of Receipts included in the Accounts for 1940 but not entered in the Bank pass-book until 1941 ...	...	...	...	...	...	28 13 6	160 2 6
£72		Total S ...	...	...	...	...	...	£160 2 6	
£5,931		Total Receipts ...	...	...	...	...	...		£3,524 19 4
£6,362		TOTAL ...	...	...	...	...	...		£4,539 4 3

FOR THE YEAR 1941.

PAYMENTS.

1940.	PAYMENTS DURING 1941.										Gross, including Transfers.			Direct.		
£											£	s.	d.	£	s.	d.
GENERAL ACCOUNT.																
952	(a) Office Expenses...	...	...	...	...	...	...	Subhead GO	897	17	9				
393	(b) House Expenses	...	...	...	...	...	...	" GH	491	15	3				
31	(c) Donations to Societies, etc.	...	...	...	...	...	...	" GD	30	2	6				
61	(d) War Expenses	...	...	...	...	...	...	" GW	196	19	6				
722	(e) Transfers to L and P	...	...	...	...	...	...	...	555	4	0			1,616	15 0
<u>£2,159</u>	Total G	...	...	...	...	...	...	...	<u>£2,171</u>	<u>19</u>	<u>0</u>				
LIBRARY FUND.																
31	(a) Books	...	...	...	...	...	...	...	23	9	10				
127	(b) Binding	...	...	...	...	...	...	...	97	18	6				
9	(c) Arrears of Binding	...	...	...	...	...	...	...	8	18	7				
	(d) Insurance of Books for £10,500	...	...	...	...	...	...	...						130	6 11
	(e) Transfer to P for periodicals exchanges	...	...	...	...	...	...	...	254	0	0				
<u>£167</u>	Total L	...	...	...	...	...	...	...	<u>£384</u>	<u>6</u>	<u>11</u>				
PUBLICATIONS FUND.																
1,628	(a) Cost of 1941 issue	...	...	...	...	...	...	...	925	12	2				
73	(b) Arrears from 1940	...	...	...	...	...	...	...	183	0	0				
	(c) Special publications	...	...	...	...	...	...	...						1,108	12 2
	(d) Transfer	...	...	...	...	...	...	...	
<u>£1,701</u>	Total P	...	...	...	...	...	...	...	<u>£1,108</u>	<u>12</u>	<u>2</u>				
REPAIRS TO PREMISES FUND.																
27	(a) Petty Repairs	...	...	...	...	...	...	...	4	10	10				
	(b) Periodical Repairs	...	...	...	...	...	...	...	29	0	6				
	(c) Special Repairs	...	...	...	...	...	...	...	21	17	3				
	(d) Transfer to G	...	...	...	...	...	...	...	265	15	5			55	8 7
<u>£27</u>	Total R	...	...	...	...	...	...	...	<u>£321</u>	<u>4</u>	<u>0</u>				
ENDOWMENT FUND.																
1,615	(a) Investment of Bequests	...	...	...	...	...	...	...	200	0	0			200	0 0
	(b) Transfer to G for 34 Life Fellows who have compounded for their subscriptions	...	...	...	...	...	...	...	71	8	0				
232	(c) Transfer to G of unexpended balance	...	...	...	...	...	...	...	207	11	11				
<u>£1,847</u>	Total E	...	...	...	...	...	...	...	<u>£478</u>	<u>19</u>	<u>11</u>				
SUSPENSE ACCOUNT.																
	(a) Clearance of payments included in the Accounts for 1940 but not entered in the Bank pass-book until 1941	...	...	...	...	...	...	...	£626	5	7			626	5 7
38	(b) Transfer to G for subscriptions received in 1940 for 1941	...	...	...	...	...	...	...	19	18	0				
7	(c) Transfer to P for donations received in 1940 for 1941	...	...	...	...	...	...	...	50	0	0				
<u>£45</u>	Total S	...	...	...	...	...	...	...	<u>£696</u>	<u>3</u>	<u>7</u>				
<u>£5,946</u>	Total Payments	...	...	...	...	...	...	...						<u>£3,737</u>	<u>8 3</u>
BALANCE ON 31ST DECEMBER, 1941.																
+ 171	Library Fund	...	...	...	...	...	...	...	
+ 62	Publications Fund	...	...	...	...	...	...	...	777	17	5				
+ 321	Repairs Fund	...	...	...	...	...	...	...	
- 12	Endowment Fund	...	...	...	...	...	...	...	
+ 72	Suspense Account	...	...	...	...	...	...	...	133	11	0				
- 198	General Fund	...	...	...	...	...	...	...	
	Total Credit	...	...	...	...	...	...	...						911	8 5
	Total Debit	...	...	...	...	...	...	...						109	12 5
<u>416</u>	Total Net Credit Balance	...	...	...	...	...	...	...	<u>£801</u>	<u>16</u>	<u>0</u>			<u>£801</u>	<u>16 0</u>
<u>£6,362</u>	TOTAL	...	...	...	...	...	...	...						<u>£4,539</u>	<u>4 3</u>

(Signed) W. H. EVANS, Treasurer.

THE PRESIDENT'S ADDRESS

AFTER more than two years of carrying on under the difficulties consequent upon wartime conditions, we find ourselves once more taking stock of our position, and again I think that the Reports of the Council and of the Treasurer that we have just heard need cause us no undue anxiety. Anxiety to some degree there must be, but I think you will agree that so far we have come through the strain really very well. The number of resignations, though high, might easily have been higher, and I regret to say that the toll taken of our Fellows by death has also been heavy. We have to presume the death on war service of

DOUGLAS S. WILKINSON, elected 1922. An experienced yachtsman, he offered his services to the Admiralty and was granted a commission in the R.N.V.R., but on his way out to take up his duties his ship was torpedoed and he was among the missing. As an entomologist on the staff of the Imperial Institute of Entomology he specialised in the Hymenopterous family BRACONIDAE, and had long been engaged on a monograph of the genus *Apanteles*.

H. F. D. BARTLETT, elected 1907, lived for many years on the island of St. Helena. He was interested in the beetle fauna of the island, which he thought had diminished since the publication of Wollaston's work, 1877, largely owing to the disappearance before cultivation of much of the native forest.

MAUD DORIA BRINDLEY (née HAVILAND), elected 1924, died at the early age of 50. It was as an ornithologist rather than an entomologist that she first became known, with her book *A Summer on the Yenesei*, 1915. During the last war, when serving with the Scottish Women's Hospital in Bessarabia, she turned her attention to the Aphids and subsequently did some valuable work on the development of the Chalcidoid and Cynipid parasites of this group of insects. In systematic work her study of the MEMBRACIDAE collected by the Oxford Expedition to British Guiana, of which she was a member, is perhaps the most important. She had a charming personality, and was a frequent attendant at our meetings. (1941, *Ent. mon. Mag.* 77 : 136.)

WILLIAM MONOD CRAWFORD, B.A., elected 1922, died 9th April in his 67th year. Formerly in the Indian Civil Service, from which he retired in 1919, he collected butterflies extensively in India and subsequently at home and in Europe, but of late years was more interested in beetles, particularly the water-beetles of Northern Ireland. He was one of the editors of the *Irish Naturalist*. (Dr. M. P. Crawford *in litt.*)

HARRY ELTRINGHAM, M.A., D.Sc., F.R.S., elected in 1903, was Publications Secretary of the Society from 1922 to 1925, and President in 1931-32, and was also a member of the Entomological Club. His special study was the histology of insects, and for this work he had constructed an unusually well-equipped laboratory, many of the instruments used being of his own design and construction. He also excelled as a sportsman, being a fine oarsman, an accomplished skater and a keen shot. He was in his 69th year at the time of his death. (1941, *Ent. mon. Mag.* 78 : 16.)

WILLIAM HOLLAND B. FLETCHER, elected in 1883, was with one exception the senior Fellow of the Society. He was keenly interested in the British

Lepidoptera, particularly perhaps the ZYGAEINIDAE and the Micros, upon which he contributed several notes to the magazines some 50 or 60 years ago, and also assisted with the preparation of Buckler's *Larvae* after Hellins' death. His collection was bequeathed to Cambridge University.

HENRY OLIVE HOLFORD, elected 1910, died on 3rd March, aged about 72. He was a tea planter in Ceylon and interested in the Lepidoptera of the island. On his return to this country, some 30 years ago, he transferred his attentions to the British Lepidoptera, especially those of his property at Elstead. His collection is left to the Haslemere Museum.

JAMES H. KEYS, elected 1900, died 14th January, 1941, at the age of 85. He was a printer and publisher by profession until his retirement in 1933. He was a keen student of the British Coleoptera, of which he was able to add many species to our faunal list. (1941, *Ent. mon. Mag.* 77 : 60.)

CHARLES GEORGE LAMB, M.A., Sc.D., elected 1924, was emeritus reader in electrical engineering in the University of Cambridge. He was a man of great versatility and wide interests; as an entomologist he was a keen collector of the British Diptera, specialising in the Acalyptera, upon which he was an authority. (1941, *Nature* 147 : 702.)

J. LEVICK, elected 1925, amassed a large collection of Lepidoptera, which he bequeathed to the British Museum.

PROFESSOR HANS REBEL of the Vienna Museum, an Honorary Fellow elected in 1931, was an authority of world-wide repute on the Lepidoptera.

MISS JANET RIDDELL, elected 1929, was an American Fellow. Her paper on some aberrations of the genus *Zerene*, the three coloured plates of which she presented to the Society, is published in this year's *Transactions*.

THE RIGHT REVEREND WALTER GODFREY WHITTINGHAM, D.D., Bishop of St. Edmundsbury and Ipswich, elected in 1911, and re-elected in 1925, died on June 17th in his 80th year. As an entomologist he was well known as a student of the Microlepidoptera. (1941, *Entomologist* 74 : 191.)

Of the following Fellows whose deaths are reported I regret that I have no particulars :—

C. BARTLETT, elected 1932; LIEUT.-COL. C. TURNER CLARK, F.Z.S., elected 1909; A. MOORE, M.D., elected 1922.

The death of a former Fellow, FRANCIS ARTHUR HERON (1898–1921), at the age of 76, is also announced. He was for many years a Lepidopterist on the staff of the British Museum (Natural History), from which he was forced by ill health to retire in 1910. (1941, *Entomologist* 75 : 23.)

Of our continental brethren we have little knowledge, but learn that the eminent Swiss myrmecologist, Dr. FELIX SANTSCHI, died in North Africa in November 1940. (1941, *Ent. Rec.* 53 : 99.)

In reviewing various subjects as a base for my address today it was natural, I suppose, to consider first some aspect of Entomology in connection with the war; but though it was little likely that anything I might say could prove to be of value to the enemy it was soon obvious that the proper time for such a review is when the war is won and reports on what has been done are available. Next I experienced the difficulty facing any specialist whose subject is not of general interest of finding a subject that would appeal to a gathering of entomologists of all branches, and have finally decided upon one that has for long had a great fascination for me, but which I have never had the opportunity to follow up as I should wish, a defect that has now been further accentuated by the dispersal of libraries and of entomologists, though I have to thank Messrs.

G. Nixon and R. L. Coe for help with their respective groups. My remarks must therefore be taken rather as random musings than as a considered survey of the subject, and as such I offer them to you now in the hope that others will be stimulated to pursue some of the points further and to greater advantage.

SOME ASPECTS OF PARASITISM IN INSECTS.

The term parasitism in connection with insects is in general somewhat loosely used to cover a range of very different relationships between the parasite and its host. Thus the association may be between an adult insect and a vertebrate host, often of a more or less temporary nature and for the purpose of feeding only, as in the case of mosquitoes and bugs, or, as in the case of the fleas, NYCTERIBIIDAE, and lice, it may be more persistent (epizotic), the parasite also enjoying the more equable climate of its host's immediate vicinity. Sometimes it is not the adult stage of the insect that is the parasite, but the larva, as in the dipterous family OESTRIDAE. But more frequently the association referred to as parasitism is that between one insect and another, and even there the term is used to cover relationships of very diverse nature. For example, in the Aculeate Hymenoptera certain genera are often said to be parasitic upon others when the parent introduces its egg into the nest of the host, where the resultant larva will thrive upon the stores prepared by the host parent for the benefit of its own progeny. The parasite in such cases is sometimes, and more correctly, termed an inquiline, or cuckoo, upon the host, though as the young larva frequently takes the precaution of first destroying the egg, or young larva, of the host it should in such cases perhaps be considered a predator. Another type of relationship frequently included in the term parasitism is seen in the Fossorial Hymenoptera (THYNNIDAE, SPHEGIDAE, etc.) where the huntress parent, having secured and stung to immobility her prey, deposits an egg upon it and leaves her progeny to consume the still living but paralysed victim (*Methoca*). From this it is but a step to laying an egg upon (or even within) the body of the living victim without going to the trouble of immobilising it, a procedure that has the advantage of allowing the doomed host to continue feeding and growing until such time as the terror within has attained its full size and either finishes off its victim or abandons it to a slower death from weakness and starvation (ICHNEUMONIDAE, TACHINIDAE, etc.). Even the predatory factor on the part of the parent may be absent and the egg of the parasite merely laid upon a leaf and in due course swallowed by the unwary host, or perhaps it hatches and the young larva has itself to hunt out a suitable victim (some TACHINIDAE, Meloid beetles, Strepsiptera, etc.). It is hardly surprising that in these latter cases, in which the chances against the young larva must be enormous, the eggs are numerous but small compared with those species in which the parent seeks out the host for its progeny. At the other end of the scale one finds insects in the rôle of hosts to parasites of other classes of animals, such as mites, worms, etc., but of these I am not prepared to speak now.

For my present purpose the nature of the association is immaterial and I employ the terms parasite and parasitism in the widest sense to imply that the parasite, either in the adult or larval state, or both, lives at the expense of the host without at once making a meal of it; in other words, it is not a simple predator. I shall, however, have to differentiate between certain types of parasitism.

In all these types of relationship I think that one may take it that the

more intimate the association between host and parasite the farther it goes back in the phylogeny of both species; also that the more generally the habit is developed within any group, whether genus, family, or order, the farther back in the ancestry of that group must it have arisen. In illustration one may assume that the development of the parasitic, or more strictly inquiline, habit in the wasp *Vespa austriaca*, a cuckoo in the nest of other species of its own genus, is of more recent origin than the development of a similar habit in all the species of *Psithyrus*, cuckoos in the nests of various species of the closely allied genus *Bombus*, and this again is of much later origin than in the family CHRYSIDIDAE, or yet more than the habit characteristic of the whole of the Hymenoptera Parasitica, or of the order Strepsiptera.

Thus from the commencement of the parasitic habit in the phylogeny of both members of any such association the evolution of the parasite has been linked with that of the host and has become increasingly intimate with it. With the breaking up of the primitive host-species to form the genera, or families, of later horizons, so the parasite has undergone a somewhat parallel evolution, but in the latter case it has been found, at least in certain groups, that its evolution has not quite kept pace with that of the host but lags, as it were, a step behind, so that one species of parasite is found in association with several allied species of the host genus, while a different species occurs with another species-group of that genus, or with another allied genus, a further genus of the parasite with another family of the host, and so on. It is not of course suggested that this scheme is to be seen everywhere in operation with mathematical nicety, but only that a tendency in this direction is frequently to be observed. This lag on the part of the parasite was, I believe, first recognised in the study of the Mallophaga in relation to their bird hosts, and applied with some success in clearing up some doubtful affinities both of parasites and hosts, and might perhaps similarly repay study in other groups of parasites. In the largest of these, the parasitic Hymenoptera, the tendency, though still discernible in the association of groups of greater or less extent of the parasites with corresponding groups of the hosts (thus the genera *Trogus* and *Protichneumon* are attached predominantly to the hawk-moths, *Metopius* to the LASIOCAMPIDAE, *Acoelius* and *Colaspis* to the minute NEPTICULIDAE and GRACILLARIIDAE, the SCOLIIDAE to Lamellicorn beetles, POMPILIDAE to spiders, the TORYMINAE and EURYTOMINAE in the CHALCIDIDAE to gall-making larvae, ENCYRTINAE and APHELININAE to COCCIDAE, and such associations may be cited almost without end), the tendency is to a great extent masked, from a variety of causes. Most important of these, probably, is the great degree of secondary extension in the host range that has taken place. The degree to which range of host selection varies with different species is notorious, some parasites being rigidly confined to one host while others will accept hosts of widely different affinities. Conversely certain host species have but one constant parasite recorded while others have a long list of recorded species. Of these conditions it seems probable that host-restriction is the more primitive and that extension of selection is secondary and has occurred in some cases fairly recently, in others more remotely in their past history (see, however, CHRYSIDIDAE, p. 45). The respective group-associations of host and parasite are further concealed by the occurrence of hyperparasitism, the true host being not the apparent one, but a parasite thereof. This latter phenomenon affords one well-known explanation of the extraordinarily wide range of hosts recorded for certain species of parasites, hosts comprising not only different orders of insects, but even other classes of Arthropods, such as spiders and Crustaceans, a range that may be

drastically reduced when it is found that the true host is perhaps a dipterous parasite or group of allied parasites in these widely separated hosts. A certain amount of concealment is no doubt also due to errors of various kinds that have crept in. There are probably errors in classification due to the systematics of the parasitic Hymenoptera being, in parts, as yet in a somewhat tentative state, and it is in the correction of these errors that a study of host relationships may be expected to play a part. Errors in determination are only too abundant, due partly to the inherent difficulties in the study of the group, but partly also to hasty and untested determinations. The blame for such, I am afraid, is often to be laid at the door of students of host orders rather than of the hymenopterists, among whom, at least in recent years, a much more critical spirit seems to have arisen. Errors in host records are frequently to be attributed to hasty or inadequate observations, *e.g.*, of an assumed but not actually observed association between parasite and host, sometimes through the unsuspected presence of a second possible host species, and finally through the intervention of hyperparasitism. The tendency nowadays is certainly to distrust these very wide ranges of recorded hosts and to demand critical examination before a record can be accepted. As an example of this modern spirit of criticism I may recall the late D. S. Wilkinson's work on *Apanteles*, where in discussing the host relationships of a species he enumerated all the recorded hosts, some of which he could confirm, others he accepted provisionally as possible, while others he deliberately rejected, on the grounds of their systematic relationships, as impossible. Whether or not such scepticism is going too far can be decided only by the accumulation of careful records. Probably in most cases it will be justified, though it is notoriously unwise to conclude from the known habits of one species what will be the habits of its near ally, and there is no doubt that some species are much more rigid in the selection of host than are others closely akin to them. This applies not only to species of the present day, but also no doubt to past stages in the phylogeny of both host and parasite, and would thus account for the much greater adaptability, in this respect, of some whole groups of species or even genera.

Although cases of extraordinarily wide range in host selection are thus open to suspicion, there are nevertheless well-attested cases of certain species that have received much critical study having a very wide range of hosts, *e.g.* *Hemiteles areator*, usually a dipterous parasite, has been bred also from Lepidoptera, Coleoptera and Hymenoptera.

This unreliability of records makes it impossible to weigh properly certain interesting cases; for instance, whether the record of *Ephialtes carbonarius*, normally a parasite of the twig-boring larvae of Longicorn and Curculionid beetles, from certain SESIIDAE, or of *Macrocentrus marginator*, normally a parasite of SESIIDAE, from the weevil *Ceuthorrhynchus lapathi*, are instances of the parent parasite being seduced by similarity of habit on the part of the host from its true phylogenetic allegiance, or of definite catholicity of taste on the part of the parasite, or of error on the part of the recorder.

In the Hymenoptera parasitism both of the inquiline and of the entomophagous types is highly developed. The Order as a whole appears to fall into two unequal sections, the smaller having phytophagous larvae, the larger insectivorous larvae. Of the former one finds four distinct groups, the sawflies, the gallflies, the SAPYGIDAE, and the bees. The sawflies, normally with caterpillar-like, leaf-feeding larvae are classed as a suborder by themselves, Symphyta, and the vegetarian habit is probably primitive. The gallflies, CYNIPIDAE, though mostly vegetarian, include subfamilies which are parasitic in habit.

They have no close affinity with the sawflies, and it seems likely that though now a dominant family in temperate regions of the world, the vegetarian habit in this group is secondary and that they have evolved from parasitic ancestors. Certain genera exhibit an inquiline type of parasitism, living in the galls of allied genera, often without detriment to the gall-maker, but I am unable to point to any instance of entomophagous parasitism that might be supposed to have evolved from such an inquiline type. The SAPYGIDAE in habits resemble the inquiline bees, the egg being laid in the cells of *Osmia* and *Chelostoma* and the larva, after destroying that of its host, feeds upon the pollen, etc. stored up by the host. The last series with vegetarian larvae, the bees, form a highly specialised section in a group in which all the more primitive sections, the fossors, wasps, etc. have insectivorous larvae, and it seems at least probable that they have developed from an insectivorous stock. Within this group also is to be found parasitism of an inquiline type in different stages of advancement, but none of entomophagous type.

The section with insectivorous larvae comprises the huge mass of the Parasitica, including the Ichneumonoidea, the Chalcidoidea and the Proctotrupoidea, together with (fundamentally) the Aculeates and the CYNIPIDAE, the whole forming the second suborder, Apocryta. Of these, besides, as has been shown, the Aculeates and the Cynipids, the Chalcids have also in rare cases developed a phytophagous habit (*Isosoma*, etc.). Normally in all these the selection of the destined host is made by the adult female parent, who lays her eggs on or within the body of the victim. In the Aculeates, and in certain groups of both Ichneumonids and Chalcids, when the egg is laid on the skin of the host the larva on hatching remains outside the body of its victim, *i.e.* is an ectoparasite, though in other groups it at once penetrates the body and lives as an internal parasite (endoparasite); but in very many cases the parent herself pierces the skin of the host with her ovipositor and lays the egg within it, the larva again being an endoparasite. Thus, if these suggestions are sound, it is found that with the exception of the sawflies the Hymenoptera have all come from a stock in which the larva is insectivorous and that they have been split up into sections (Superfamilies) of which the gallflies (Cynipoidea) and bees (Apoidea) and, to a less extent, the Chalcids (Chalcidoidea) have each developed branches with a vegetarian habit, each such branch developing inquiline parasitism within itself.

The CHRYSIDIDAE are a group of unusual interest in this respect. Their larvae appear to be normally ectoparasitic on the larvae of VESPIDAE and APIDAE, but the young larva delays attacking its host until the latter is full grown. The species that parasitise *Odynerus*, however, which stock their cells with paralysed larvae of small Lepidoptera and Coleoptera, have taken to devouring this store and thus starving the host larva, an interesting case of the development of an inquiline out of an ectoparasitic habit. The pollen and honey stored by the Apid hosts do not form a suitable pabulum for the *Chrysis*, though it has been noted as being sometimes eaten by the waiting parasite *C. ignita*; and some other species with numerous hosts, show signs of the formation of definite races according to the host, *i.e.* incipient species formation, which would indicate that in this group host restriction may be secondary to wide selection.

The free living type of first-stage larva common in the parasitic groups of the Coleoptera and found also in the Diptera is rare in the Hymenoptera but occurs in a few CHALCIDIDAE (*Perilampus* etc.) which deposit their eggs on the vegetation.

The ICHNEUMONIDAE are predominantly parasites of the Lepidoptera, often exhibiting strongly developed host specificity, sometimes in species, sometimes in groups of species or in genera, and in some cases such groups have specialised in hosts of other orders, Coleoptera, Diptera, Hymenoptera, even as hyperparasites in their own family. The BRACONIDAE are less devoted to the Lepidoptera and again frequently exhibit strong partiality on the part of the whole genera or subfamilies for hosts of a definite group, and the same tendency is shown quite as strongly by the Chalcidoidea, a feature which indicates the adoption of this preference at an early epoch in their phylogeny.

Of peculiar interest are certain cases of divergence from the habit normal in the group; thus various species of ICHNEUMONIDAE (*Hemiteles*, *Pezomachus*, *Pimpla*, etc.) have been reared from the egg-sacks of spiders. Of the first two genera mentioned many species are known to be hyperparasitic, and it is possible that the species in question are, or perhaps in former times were, hyperparasitic on the larvae perhaps of *Mantispa*, though no species of this genus is now found in Britain, but this is definitely not the case with the *Pimpla*. Many species of *Pimpla*, however, attack the host larva after it has spun its cocoon, piercing the latter with their long terebrae, and it seems probable that a particular species in the past may have been deceived by the webbing of the spiders' egg-sack, and that the larvae proved sufficiently adaptable to the new pabulum to develop there, and become the ancestor of the modern group of species with this habit.

Melittobia acastra (CHALCIDIDAE) appears to afford a somewhat similar case of the parent being satisfied with some sort of shell or cocoon rather than selecting a definite species for oviposition, the puparium of a dipterous larva being accepted as readily as the silken cocoon of a Lepidopteron.

The case of *Smicra*, a large Chalcid which oviposits in the egg masses of *Stratiomys* (Diptera), is different, for here it would seem that the ova are deposited within individual eggs of the fly and that hatching, or at least growth, must be deferred until the host has attained considerable size.

One may note also in the family CHALCIDIDAE, a dominant family of parasitic Hymenoptera, a few genera that have become phytophagous in habit, e.g. *Isosoma* has adopted a gall-forming habit on grasses. This genus is closely allied to *Eurytoma*, which is to a great extent parasitic upon gall-forming insects, both Hymenoptera and Diptera, including its relative *Isosoma*. This latter association is almost certainly of secondary and recent origin, whereas *Isosoma* must have diverged from the *Eurytoma* stock much earlier. On the other hand, in the gall-making family CYNIPIDAE certain groups are entomophagous parasites in habit, e.g. the IBALINAE on the SIRICIDAE, the ALLOTRIINAE on APHIDAE, FIGITINAE and EUCOELINAE mainly on dipterous larvae, a habit in each case that must have been acquired very early in the Cynipid stem, and offers no suggestion of having passed through an earlier inquiline period; indeed it may well be that these parasitic forms are the more primitive and that the highly successful gall-making section with well-protected larvae are the offshoot from a parasitic stock.

The different types of association involved in the term parasitism are well illustrated in the Diptera; thus of those which suck the blood of mammals are the CULICIDAE and TABANIDAE in which the habit, though fairly widely distributed in the family, is not universal, is confined to the female sex, and is not accompanied by intimate association, so that it may be assumed to be of fairly recent origin; in the genus *Glossina* (MUSCIDAE) the association is developed to a very similar degree but obtains in both sexes of all the species, and the distri-

bution of the group is curiously restricted to tropical Africa, another feature that suggests recent origin. In the HIPPOBOSCIDAE host-restriction is much more marked, accompanied by a greater degree of intimacy in the associations and by some degree of adaptive degeneration (loss of wings) on the part of the parasite, so that one may assume that the bloodsucking habit originated much further back in their history than in the groups previously considered. Yet a further step in the series is afforded by the NYCTERIBIDAE, all of which are epizoid parasites on bats. In the Siphonaptera (fleas) a very early offshoot from the dipterous stock, degeneration is yet further advanced, the origin of the habit being probably coincident with, if it did not precede, its separation from the parent stem.

The BRAULIDAE are peculiar in that as adults they are epizoid parasites on another insect, the honey bee, but their larvae are of fairly normal dipterous type living in the combs; thus in spite of the loss of wings the parasitic habit is no doubt of comparatively recent origin. A bloodsucking habit with insect hosts is also found in certain midges (CERATOPOGONIDAE).

Another type of parasitism is exhibited by the OESTRIDAE in which the mammalian host is selected by the parent fly as affording a suitable nursery for its offspring, the adult itself deriving no benefit from the host. Again the habit is, I believe, general throughout the family and so must be of ancient origin. Host restriction is also very pronounced, a feature that in view of the laxity of the association between the adult fly and the host is rather remarkable. It is possible that the origin of this type of parasitism is to be sought in the habit of certain species of *Lucilia* (MUSCIDAE) of which the larvae cause extensive and fatal sores on the skin of sheep. In the TACHINIDAE are two types of association with insect hosts, the inquiline (rarely) as illustrated by *Milto-gramma*, which deposits its eggs on the prey of various species of Fossorial Hymenoptera, a highly specialised habit that may have evolved from the entomophagous habit normal to the family, but not vice versa. On the other hand, it may have evolved directly from the saprophagous habit so general in the MUSCIDAE. The entomophagous habit in the TACHINIDAE is comparable with that found in the generality of the parasitic Hymenoptera, except that in certain cases there is not even host selection on the part of the parent, the eggs being merely deposited on the leaves of plants, or in the earth, to be swallowed by the unwary host, or for the young larvae to find their own hosts. This latter habit is found also in the CYRTIDAE, of which the larvae are endoparasitic in spiders. Often the eggs (TACHINIDAE) are deposited on the skin of the host, but the penetration of this by the parent parasite is also frequent. Host specificity is probably less strongly marked in the Diptera than in the Hymenoptera, even when selected by the parent; thus *Comptosia concinnata*, which oviposits within the body of the host larva, has been bred from a very large number of Lepidopterous hosts, as well as from other Orders. Further, in the TACHINIDAE, unlike the Hymenoptera, the ectoparasitic habit appears to be unknown.

A parasitic habit has also been formed in other families of Diptera but details are, I believe, incompletely known; thus the larva of the PIPUNCULIDAE are endoparasitic in Homoptera; those of many BOMBYLIIDAE are parasitic on various Hymenoptera, others on lepidopterous larvae, while others prey upon the egg pods of Orthoptera; the CONOPIDAE are mostly endoparasites in the bodies of adult bees and wasps. In some of the small species, too, such as the PHORIDAE, a few appear to have turned their attention from dead animals, insects, mollusca, etc., to the living animal in which they have become parasitic.

In the Coleoptera parasitism is rare, but such cases as are known are of considerable interest. The epizoid type is represented by *Platypsyllus* (near STAPHYLINIDAE), of which both adults and larvae live in the fur of beaver. From the degree of modification reached one must conclude that the habit is of ancient origin. A curious example, obviously of comparatively recent origin, is supplied by the genus *Uroxys* (COPRIDAE), the adults of which live in the fur of sloths: of its early stages, unfortunately, nothing is known. *Macropocopsis* has a similar habit on the skin of kangaroos. The entomophagous type of parasitism is exhibited by several independent instances. Thus the first-stage larvae of *Arsinoë* (CARABIDAE) is an active predacious creature that attacks and hangs on to the large but helpless larvae of *Catamerus* (TENEBRIONIDAE), and burrowing into the thorax develops there. In *Aleochara* (STAPHYLINIDAE) the young larvae are active and attack dipterous puparia, burrowing into them and there undergoing a hypermetamorphosis to complete their transformation. The first-stage larva of certain species of *Lebia* parasitise the larvae of CHRYSOMELIDAE in a similar manner, with some degree of hypermetamorphosis in their later stages.

The RHIPIPHORIDAE, though but a small family, exhibits an interesting series of life histories in this respect; thus the larvae of *Sharpides* (first-stage not known) is an endoparasite of the wood-boring larva of *Prionoplus* (PRIONIDAE) in New Zealand, the only such instance known to me; of *Metoeus* the mobile first-stage larva bores its way into a wasp larva but later emerges to complete the destruction of its host, while that of *Macrosiagon* behaves in the same manner to *Odynerus* (Vespoïd), and the larva of *Rhipiphorus* is an external parasite of *Halictus* (Apoid); finally in *Rhipidius* the freely mobile first-stage larva enters the body of a young cockroach, but emerges when full grown to pupate outside. Adaptation to a parasitic life is here further developed in that the female adult is apterous, though free-living.

In the family MELOIDAE the habit is general and so of ancient origin, but is not uniform throughout the family. Many genera, *Meloë*, *Lytta*, etc., are parasitic (inquiline) in the nests of different bees; of others, *Épicauta*, etc., the larvae live in the subterranean egg-pods of locusts and grasshoppers. Some of these attain their objective by burrowing through the earth, but better known is the method adopted by others of hitch-hiking (phoresy), waiting in some flower for the arrival of a bee, upon which they jump and are then transported to her nest. One may reasonably suppose the former habit, as the more general, to be the more primitive, and that the primary larva of some ancestral species, while burrowing in the earth in search of a suitable bees' nest, came upon the egg-pod of a grasshopper and was sufficiently adaptable to be able to develop upon it and so found a new family line. That such an adaptation has occurred more than once in the history of the family is probable from the fact that while allied groups of genera fall into one set or the other, yet within the same genus, *Mylabris*, examples of both habits are to be found, indicating that the change of habit took place in this genus at a later epoch than in the other genera.

Comparable in many ways with the life history of *Rhipidius* is that of the Strepsiptera, by many writers held to constitute an Order in themselves, by others classed as a family, STYLOPIDAE, of aberrant Coleoptera most nearly allied to the RHIPIPHORIDAE. One of the chief reasons for according them ordinal rank has been that adaptation to a parasitic life (degeneration) has advanced further than in any group of Coleoptera in that even the adult female does not leave the body of the host, but merely protrudes therefrom the fore

part, cephalothorax, and has lost all limbs and appendages. The recent discovery, however, of the life history of *Eoxenos*, of which the mature larvae of both sexes leave the body of the host and the female is a free-living creature with distinct head, legs and antennae, would appear to deprive this argument of much of its force. The host is in this case as yet unknown, but is possibly a cockroach; if so this would constitute another possible link with *Rhipidius*.

In the Strepsiptera the first-stage larva, which is produced viviparously, is active, very similar to that of *Rhipidius*, and has to find its own host. The adult males are attracted to light, a habit which gives no information as to their hosts or their females, so that many species and genera have been described on one sex alone. When the sexes can be correlated by breeding from infested hosts many of these genera will no doubt fall into synonymy. From those known it would appear that the superfamilies or suborders, established primarily on the structural characters of the adult, are in the main conformable with the classification of their hosts; thus the Xenoidea parasitise the Hymenoptera, the Halictophagoidea and Elenchoidea the Homoptera, the family CALLIPHARIXENIDAE (Mengeoidea?) the Heteroptera and the Stichotrematoidea (males as yet unknown) the Orthoptera.

A start in this reduction of the number of genera has already been made in the Xenoidea, largely in accordance with the families of their hymenopterous hosts. In the Halictophagoidea also the number of generic names is certainly excessive and will no doubt be similarly reduced. By thus grouping the genera with known hosts and intercalating on morphological characters those of which they are as yet unknown, some indication of what they will probably be may be afforded, and likely associations of males with uncorrelated females suggested.

From these, I am afraid, very rambling remarks it will at least be clear that one cannot hope to find any common origin for parasitism. The habit has arisen time and time again in different orders and families of insects, and at different epochs in their past history, and in the term are included habits of several different types. Though here and there hints of the evolution of the more advanced forms of parasitism through earlier and simpler forms are to be found, these, even when of the same type, do not appear always to have originated in the same way; thus the entomophagous type in the Coleoptera, with several different lines, all seem to have started from a predacious first-stage larva that has to find its own host, but in the Hymenoptera the entomophagous type, again with several lines, appears always (except in a few Chalcid genera) to start from the parent selecting the host for its offspring and depositing her egg upon or within it, a habit seen in fairly simple form in the Fossorial Hymenoptera. (The simplicity may be more apparent than real.) Of one point, at least, one can be certain; it did not first appear in any case in an advanced state of development but must have evolved gradually from some more simple state, and development did not in all cases follow the same route. It is also unlikely that it would arise in an abundant and flourishing species, but more probably in some species on the verge of extinction that thus secured an artificial aid to survival and entered on a new lease of life. Further, it would appear that in all cases the inquiline and the entomophagous types of parasitism have remained sharply distinct and that there has been no development of the second from the first as some authors have suggested. Of the early stages in any particular line of evolution one cannot hope to find any direct fossil evidence; the most that can be expected is fragments exhibiting an early stage in the development of the wing neuration or other parts of the adult, but these tell one nothing of

their habits and metamorphoses; so that one is compelled to argue solely from the analogy of such evidence as is found now existing, in one case an early stage in the line of evolution, usually of fairly recent origin and found in one species only, or, in a small group of species in a large genus; a more advanced stage of older origin will be exhibited by a whole genus or group of genera evidencing a common ancestry, while the most advanced will be shown by a whole order showing yet older origin.

Apart from the many points of more or less academic interest that I have touched upon, the subject of parasitism in insects has in recent decades assumed great economic importance in connection with the control of some of the many species of insects that form injurious pests upon our crops and stored goods, but this practical application of our knowledge of parasites and their hosts is a subject in itself and outside the scope of this present essay.

In concluding these remarks I would like once more to express to the Officers and Council, and to the office staff, my very grateful appreciation of their kindness and help, which have done so much to make my two years of office a period always to be looked back upon with pleasure. The times have been difficult, but with their ready help we have so far pulled through, and I have no doubt will continue to pull through. I regret that our Treasurer, after such a very short period of office, during which time he has thrown himself wholeheartedly into the work, finds that he can no longer continue in the position, and I would like to extend a very hearty welcome to his successor, Mr. Welti. Mr. Welti has for the last two years been Chairman of the Finance Committee, and so comes to the job knowing all about it, and I am sure that we have every confidence in him. It is now my final duty to welcome my successor in this Chair, Professor Buxton, well known to all of us. It is the first time that Medical Entomology and Hygiene has been represented in this Chair, and I am sure that we all look forward with pleasure to his tenure of the Office.

BENEFACTIONS.

Owing to the paper shortage a full list of benefactions is not printed this year. The following is a list of the donations of the amount or value of Twenty Pounds and upwards received during the year.

1941.

Dr. L. G. HIGGINS, £200, towards the cost of his paper.

W. S. GILLES (bequest), £101 11s. 4d.

Miss M. E. FOUNTAINE (bequest), £100.

Miss JANET RIDDELL, £50, towards the cost of her paper.

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